

## **CLAIMS**

What is claimed is:

1. A method for electromagnetic processing of an input wave comprising the steps of:  
receiving a modified signal derived from two or more signals that represent said input wave when combined; and  
regulating said modified signal using a digital signal containing at least one characteristic of said two or more signals .
2. A method as in claim 1, wherein said two or more signals are in quadrature with each other.
3. A method as in claim 1, wherein said characteristic used to regulate said modified signal is magnitude.
4. A method as in claim 1, further comprising the step of generating an output signal from said regulation of said modified signal.
5. A method as in claim 1, wherein said step of regulating said modified signal is performed using a plurality of segments.
6. A method as in claim 5, wherein one or more of said segments is independently controlled as a power amplifier by a portion of said two or more signals that represent said input wave to contribute power to an output signal.

7. A method as in claim 6, further comprising the step of generating an output signal by combining power outputted from one or more of said segments.
8. A method as in claim 7, wherein said step of generating an output signal by combining power is accomplished using one or more selected from the group consisting of power transformers, quarter-wave transmission lines, discrete LC components, and a Pi-networks.
9. A method as in claim 5, wherein one or more of said segments is independently controlled as a current source by said portion of said two or more signals that represent said input wave to contribute current to an output signal.
10. A method as in claim 1, wherein said received modified signal contains only one of said two or more signals used to derive said modified signal.
11. A method as in claim 1, wherein said received modified signal is derived from a sign characteristic of at least one of said two or more signals that represent said input wave when combined.
12. A method as in claim 1, wherein said modified signal is a carrier wave modulated by a characteristic of at least one of said two or more signals that represent said input wave when combined.
13. A method as in claim 1, further comprising the step of generating said modified signal.

14. A method as in claim 13, wherein said step of generating said modified signal comprises phase shifting a carrier wave to generate a phase shifted carrier wave, mixing a characteristic of one of said two or more signals that represent said input wave when combined with said carrier wave, and mixing a characteristic of another of said two or more signals that represent said input wave when combined with said phase shifted carrier wave.

15. A method as in claim 14, wherein said carrier wave and said phase shifted carrier wave have a relative phase difference of  $90^\circ$ .

16. A method as in claim 1, further comprising the step of generating said two or more signals that represent said input wave when combined.

17. A method as in claim 16, further comprising the step of processing one or more of said two or more signals that represent said input wave when combined.

18. A method as in claim 17, wherein said step of processing comprises one or more selected from the group consisting of performing correction of an amplitude characteristic of a carrier wave used in said derivation of said modified signal, correction of a phase characteristic of a carrier wave used in said derivation of said modified signal, and filtering of one or more of said two or more signals that represent said input wave when combined.

19. A method as in claim 1, wherein said electromagnetic processing of said input wave comprises RF modulation.

20. A method as in claim 1, wherein said step of regulating said modified signal comprises:  
regulating said modified signal using a digital control signal from one of said two or more signals that represent said input wave when combined to generate at least one output signal component;

regulating said modified signal using a digital control signal from another of said two or more signals that represent said input wave when combined to generate at least one other output signal component; and

combining said at least one output signal component with said at least one other output signal component to generate an output signal.

21. A method for transmitting an input wave comprising the steps of:

generating two or more signals that represent said input wave when combined;

modulating a carrier wave with at least one characteristic of at least one of said two or more digital signals to generate a modulated signal;

modulating a phase shifted carrier wave with a characteristic of another of said two or more digital signals to generate a phase shifted modulated signal;

inputting said modulated signal and said phase shifted modulated signal into an amplifier having at least two amplifying segments;

controlling at least one of said amplifying segments with a digital control signal containing a characteristic of one of said two or more signals that represent said input wave when combined to generate at least one segment output;

controlling at least another of said amplifying segments with another digital control signal containing a characteristic of another of said two or more digital signals that represent said input wave when combined to generate at least one segment output;

transmitting an output signal based upon said at least one segment output.

22. The method of claim 21, wherein said two or more signals comprise an in-phase and a quadrature signal.

23. The method of claim 21, wherein said characteristic used to generate said digital control signals is magnitude.

24. The method of claim 21, wherein said characteristic used to modulate said carrier wave is sign.

25. The method of claim 22, wherein said carrier wave is an RF signal.

26. The method of claim 22, wherein said segment amplifies power.

27. The method of claim 22, wherein said segment is a current source.

28. An apparatus for electromagnetic processing of an input wave comprising:  
an amplifier having at least two amplifying segments for receiving a modified signal derived from two or more signals that represent said input wave when combined; and

a control circuit for regulating said modified signal across one amplifying segment using a digital signal containing a characteristic of one of said two or more signals, and for regulating said modified signal across another of said amplifying segments using a digital signal containing a characteristic of another of said two or more signals.

29. An apparatus as in claim 28, wherein said two or more signals are in quadrature with each other.

30. An apparatus as in claim 28, wherein said characteristic used to regulate said modified signal is magnitude.

31. An apparatus as in claim 28, further comprising an output circuit for generating an output signal from said regulation of said modified signal.

32. An apparatus as in claim 28, wherein one or more of said segments comprises a power amplifier.

33. An apparatus as in claim 32, further comprising a combining circuit for combining an output from one or more of said segments, wherein said combining circuit comprises one or more selected from the group consisting of power transformers, quarter-wave transmission lines, discrete LC components, and a Pi-networks.

34. An apparatus as in claim 28, wherein one or more of said segments is a current source that contributes current to an output signal.

35. An apparatus as in claim 28, wherein said received modified signal contains only one of said two or more signals used to derive said modified signal.

36. An apparatus as in claim 28, further comprising:

a source of a carrier wave;

a phase shifter for phase shifting said carrier wave to generate a phase shifted carrier wave;

a mixer for mixing a characteristic of one of said two or more signals that represent said input wave when combined with said carrier wave; and

another mixer for mixing a characteristic of another of said two or more signals that represent said input wave when combined with said phase shifted carrier wave.

37. An apparatus as in claim 36, wherein said carrier wave is an RF signal.

38. An apparatus as in claim 36, wherein said carrier wave and said phase shifted carrier wave have a relative phase difference of 90°.

39. An apparatus as in claim 28, further comprising a signal generator for generating said two or more signals that represent said input wave when combined.

40. An apparatus as in claim 39, further comprising a signal processor for processing one or more of said two or more signals that represent said input wave when combined.

41. An apparatus as in claim 40, wherein said signal processor is programmed to do one or more selected from the group consisting of performing correction of an amplitude characteristic of a carrier wave used in said derivation of said modified signal, correction of a phase characteristic of a carrier wave used in said derivation of said modified signal, and filtering of one or more of said two or more signals that represent said input wave when combined.

42. An apparatus for transmitting an input wave comprising:

a signal generator for generating two or more signals that represent said input wave when combined;

a signal modulator for modulating a carrier wave with a characteristic of at least one of said two or more signals to generate a modulated signal and for modulating a phase shifted carrier wave with a characteristic of another of said two or more signals to generate a phase shifted modulated signal;

an amplifier having at least one amplifying segment for receiving said modulated signal and at least one other amplifying segment for receiving said phase shifted modulated signal;

a controller for controlling said at least one amplifying segment with a digital signal containing a characteristic of one of said two or more signals and for controlling said at least one other amplifying segment with an digital signal containing a characteristic of another of said two or more signals to generate at least one segment output; and



an output circuit for transmitting an output signal based upon said at least one output segment.

43. The apparatus of claim 42, wherein said two or more signals comprise an in-phase and a quadrature signal.

44. The apparatus of claim 42, wherein said characteristic used to generate said control signal is magnitude.

45. The apparatus of claim 42, wherein said characteristic used to modulate said carrier wave is sign.

46. The apparatus of claim 42, wherein said carrier wave is an RF signal.

47. The apparatus of claim 42, wherein said segment is a power amplifier.

48. The apparatus of claim 42, wherein said segment is a current source.